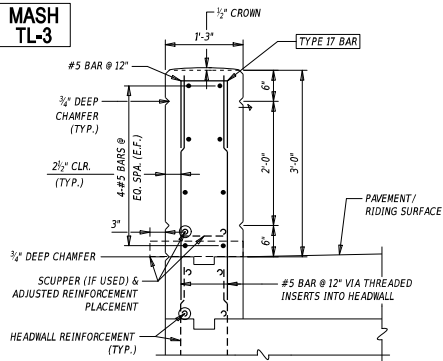
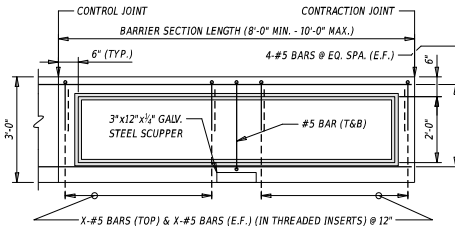


**MASH  
TL-3**

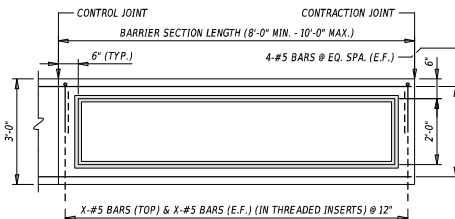


**3'-0" VERTICAL FACE BARRIER SECTION**

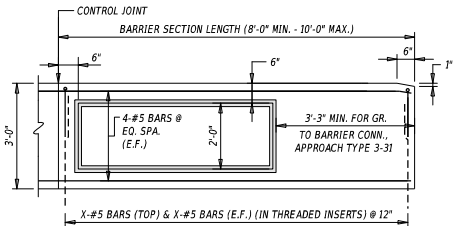
(EXAMPLE: BARRIER ATOP RIGID FRAME OR BOX CULVERT HEADWALL)



**TYPICAL INTERIOR BARRIER WITH SCUPPER**



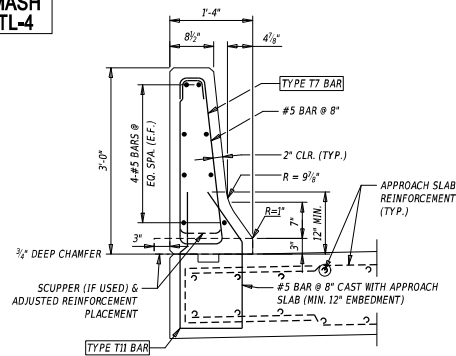
**TYPICAL INTERIOR BARRIER**



**TYPICAL END BARRIER**

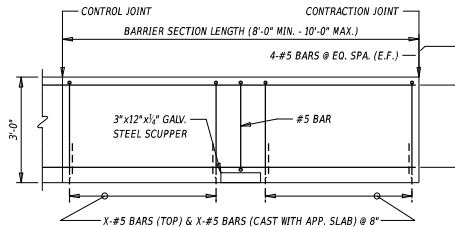
FOR ATTACHMENT WITH GR. TO BARRIER CONN., APPROACH TYPE 3-31.  
SEE ADDITIONAL END POST DETAILS ON SHEET 5.

**MASH  
TL-4**

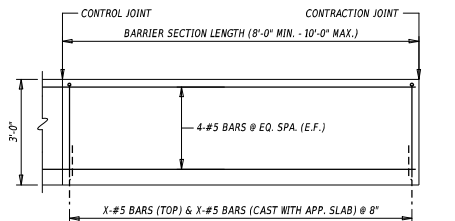


**3'-0" F-SHAPE BARRIER SECTION**

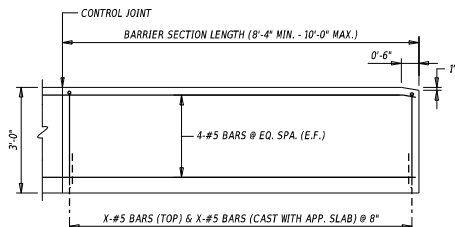
(EXAMPLE: BARRIER ATOP APPROACH SLAB)



**TYPICAL INTERIOR BARRIER WITH SCUPPER**



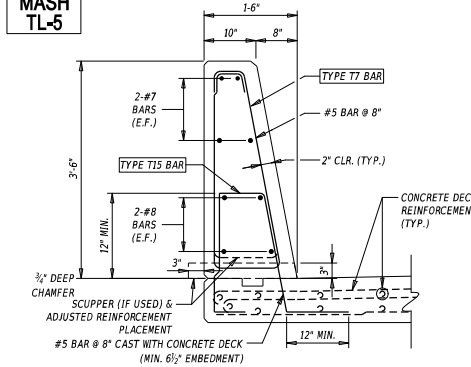
**TYPICAL INTERIOR BARRIER**



**TYPICAL END BARRIER**

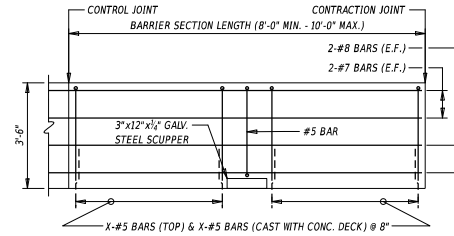
FOR ATTACHMENT WITH GR. TO BARRIER CONN., APPROACH TYPE 3-31.  
SEE ADDITIONAL END POST DETAILS ON SHEET 4.

**MASH  
TL-5**

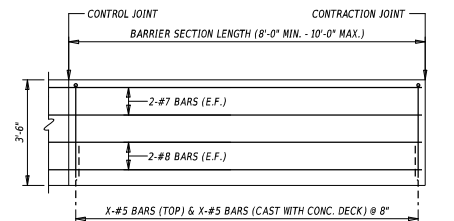


**3'-6" SINGLE SLOPE BARRIER SECTION**

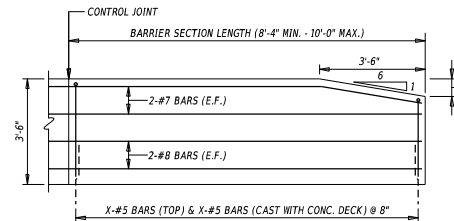
(EXAMPLE: BARRIER ATOP 8 1/2" CONCRETE DECK)



**TYPICAL INTERIOR BARRIER WITH SCUPPER**



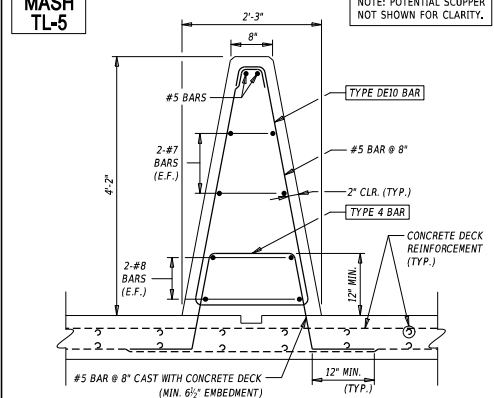
**TYPICAL INTERIOR BARRIER**



**TYPICAL END BARRIER**

FOR ATTACHMENT WITH GR. TO BARRIER CONN., APPROACH TYPE 3-31.  
SEE ADDITIONAL END POST DETAILS ON SHEET 4.

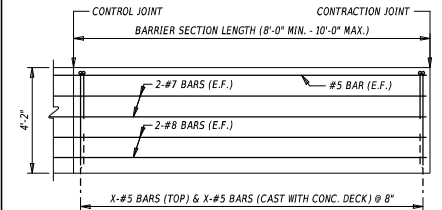
**MASH  
TL-5**



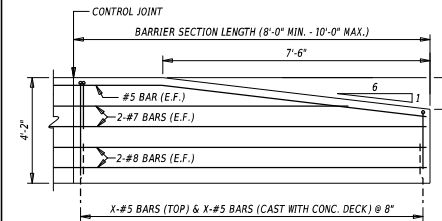
**4'-2" SINGLE SLOPE MEDIAN BARRIER SECTION**

(EXAMPLE: BARRIER ATOP 8 1/2" CONCRETE DECK)

NOTE: TYPICALLY USED AS GLARE SCREEN MEDIAN BARRIER. THIS EXAMPLE ASSUMES CURB WILL BE CONSTRUCTED ON BOTH FACES OF THE BARRIER.



**TYPICAL INTERIOR BARRIER**



**TYPICAL END BARRIER**

FOR ATTACHMENT WITH GR. TO BARRIER CONN., APPROACH TYPE 3-31.  
SEE ADDITIONAL END POST DETAILS ON SHEET 4.

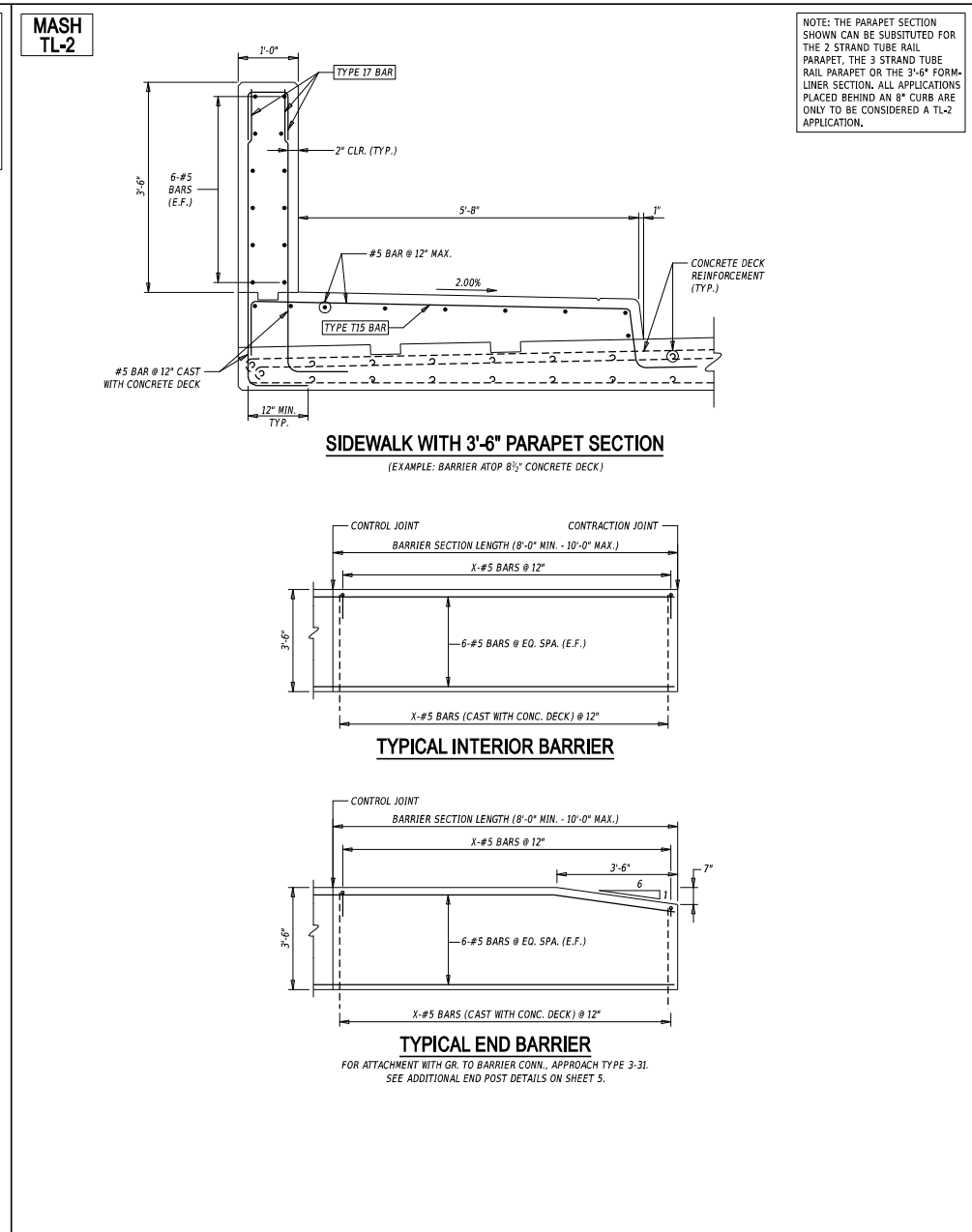
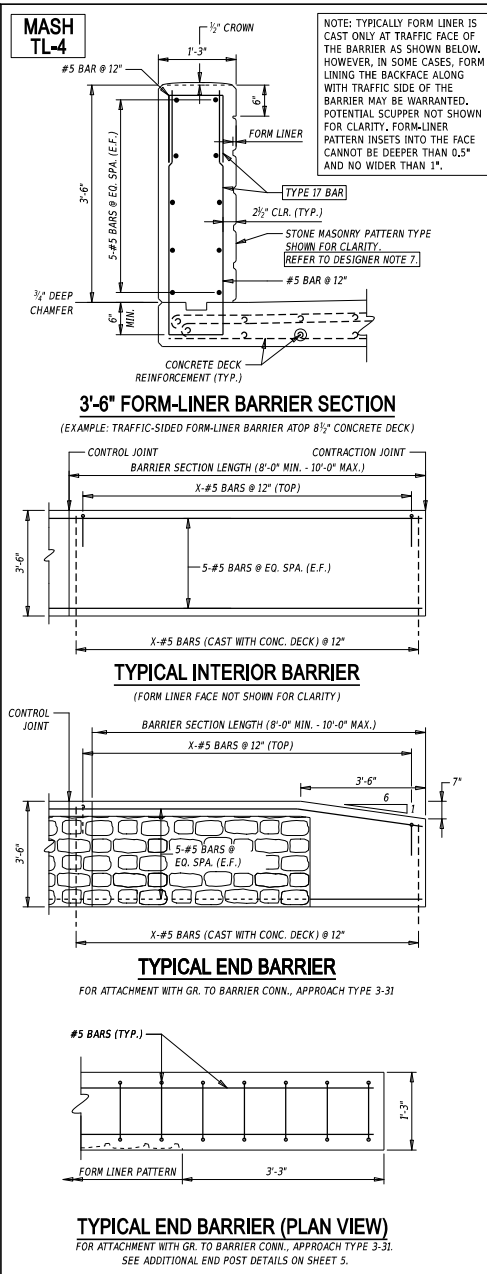
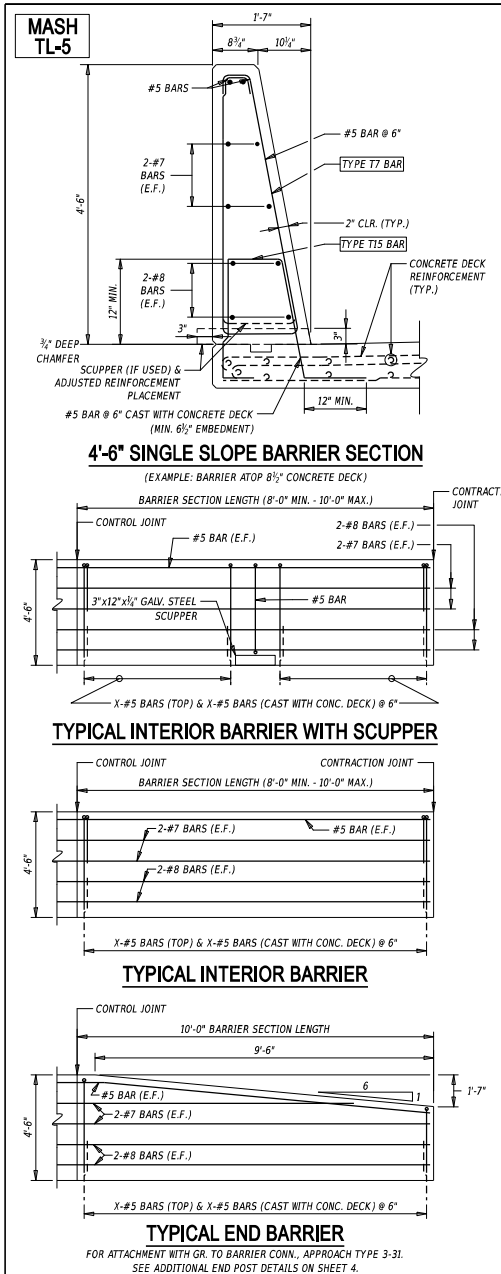


**DELAWARE DEPARTMENT OF TRANSPORTATION  
BRIDGE DESIGN MANUAL**

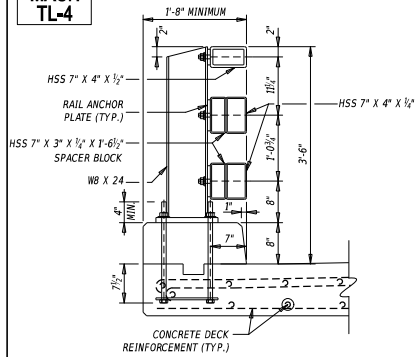
**BRIDGE RAILING DETAILS**

**NOT TO SCALE**

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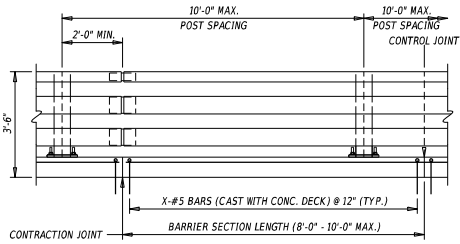


# MASH TL-4

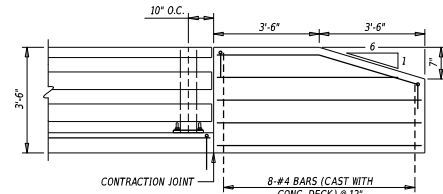


## 3 STRAND TUBE RAIL PARAPET SECTION

(EXAMPLE: BARRIER ATOP 10" CONCRETE DECK)



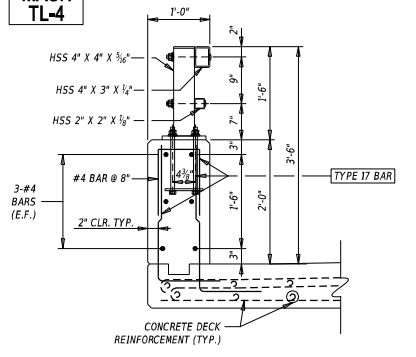
## TYPICAL INTERIOR BARRIER



## TYPICAL END BARRIER

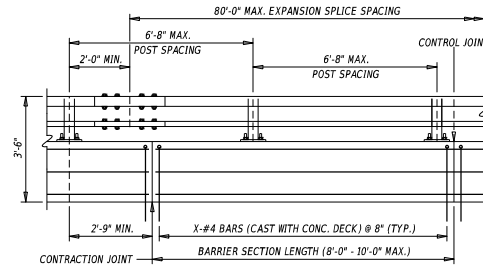
FOR ATTACHMENT WITH GR. TO BARRIER CONN., APPROACH TYPE 3-31.  
SEE ADDITIONAL END POST DETAILS ON SHEET 5.

# MASH TL-4

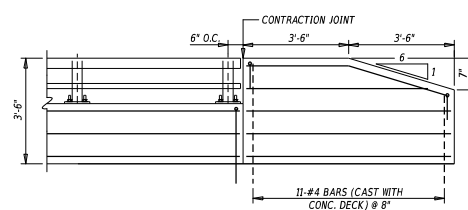


## 2 STRAND TUBE RAIL PARAPET SECTION

(EXAMPLE: BARRIER ATOP 8 1/2" CONCRETE DECK)



## TYPICAL INTERIOR BARRIER

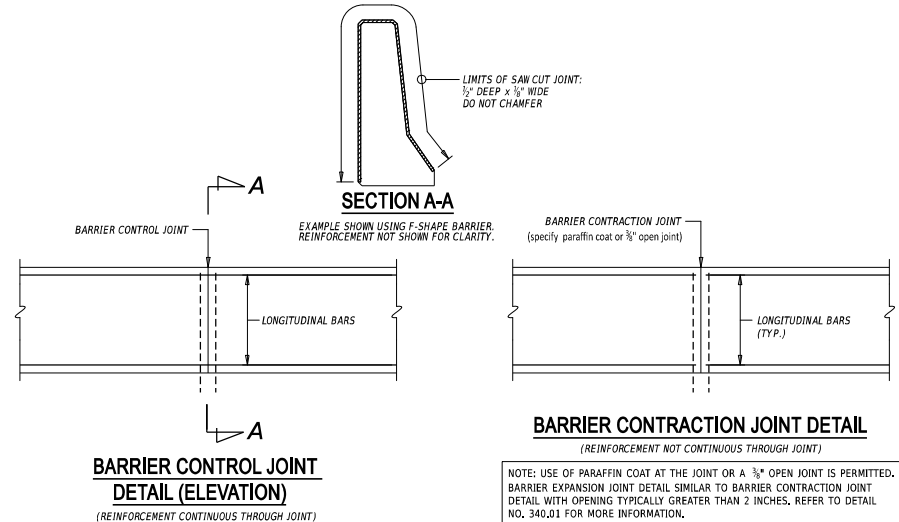


## TYPICAL END BARRIER

FOR ATTACHMENT WITH GR. TO BARRIER CONN., APPROACH TYPE 3-31.  
SEE ADDITIONAL END POST DETAILS ON SHEET 5.

## DESIGNER NOTES

1. REFER TO SECTION 106.5 - 'BRIDGE BARRIERS AND RAILINGS' FOR MORE INFORMATION.
2. 3'-0" VERTICAL FACE BARRIERS ARE THE PREFERRED BARRIERS FOR BRIDGE PROJECTS REQUIRING MINIMUM USE OF TL-3 BARRIERS, THESE BARRIERS ARE TYPICALLY USED AT PROJECTS ON LOCAL ROADS UTILIZING BOX CULVERTS, RIGID FRAMES, AND ADJACENT BOX BEAMS.
3. 3'-0" F-SHAPE BARRIERS ARE TYPICALLY USED FOR BRIDGE PROJECTS ON ARTERIAL AND COLLECTOR ROADWAYS.
4. 3'-6" SINGLE SLOPE BARRIERS ARE USED FOR BRIDGE PROJECTS REQUIRING MINIMUM USE OF TL-5 BARRIERS ON FREEWAYS AND EXPRESSWAYS.
5. 4'-2" SINGLE SLOPE MEDIAN BARRIERS SHOULD BE USED TO REDUCE GLARE FROM OPPOSING TRAFFIC AT MEDIAN LOCATIONS NOT REQUIRING GAP PROTECTION IN ACCORDANCE WITH SECTION 103.3.
6. 4'-6" SINGLE SLOPE BARRIERS ARE FOR PROTECTION OF MEDIAN GAP OF PARALLEL STRUCTURES WITH GAPS OF 6 INCHES TO 15 FEET WIDE. REFER TO SECTION 103.3.3 FOR MORE INFORMATION.
7. 3'-6" FORM-LINER BARRIERS ARE TYPICALLY USED TO MEET AESTHETICS REQUIREMENTS. THIS TYPE OF BARRIER IS TYPICALLY USED IN NEW CASTLE COUNTY, BUT MAY BE USED IN KENT AND SUSSEX COUNTIES IF WARRANTED. THE DESIGNER SHOULD SPECIFY ON THE PLANS THE TYPE, FINISH AND COLOR OF THE FORM-LINER SURFACE. USE OF ANY FORM-LINER PATTERNS OTHER THAN STONE MASONRY OR BRICK PATTERNS MUST BE APPROVED BY THE BRIDGE DESIGN ENGINEER. FORM-LINER PATTERN INSERTS INTO THE FACE CANNOT BE DEEPER THAN 0.5" AND NO WIDER THAN 1".
8. SIDEWALK WITH 3'-6" PARAPET APPLICATION MAY BE USED AS A TL-2 APPLICATION ALONG LOW-SPEED ROADWAYS WITH SIDEWALKS OR SHARED-USER PATHS WHERE THE HIGHER OF THE DESIGN SPEED OR THE POSTED SPEED IS BELOW 45 MPH. THE VERTICAL PARAPET BEHIND A VERTICAL CURB CAN BE SUBSTITUTED FOR THE 2 STRAND TUBE RAIL PARAPET, THE 3 STRAND TUBE RAIL PARAPET OR THE 3'-6" FORM-LINER BARRIER, HOWEVER, IN ALL CASES THE APPLICATION WILL ONLY BE CONSIDERED A TL-2 APPLICATION. WHERE PEDESTRIAN FACILITIES ARE PRESENT AND THE LOWER OF THE DESIGN SPEED OR POSTED SPEED IS ABOVE 45 MPH, A CRASHWORTHY TRAFFIC BARRIER MUST BE USED BETWEEN THE TRAVEL WAY AND SIDEWALK OR SHARED-USER PATH.
9. 3'-6" 3 STRAND TUBE RAIL PARAPETS ARE THE PREFERRED BARRIERS ON ROADWAYS WHERE ACCELERATED BRIDGE TECHNIQUES PRECLUDE THE USE OF A CONCRETE BARRIER. THE BRIDGE RAIL CAN ALSO BE USED AT LOCATIONS WHERE AN OPEN RAIL IS DESIRED FOR AESTHETIC PURPOSES. THIS BRIDGE RAIL REQUIRES A 10" MINIMUM END DECK THICKNESS FOR PROPER ANCHOR EMBEDMENT AND REINFORCEMENT COVER.
10. 3'-6" 2 STRAND TUBE RAIL PARAPETS ARE THE PREFERRED BARRIERS TO BE USED AS THE EXTERIOR PROTECTION WHERE THERE ARE SIDEWALK OR SHARED-USER PATHS PRESENT ON THE BRIDGE.
11. 4'-0" PEDESTRIAN RAILINGS (SHEETS 8 AND 9) ARE ANOTHER ALTERNATIVE TYPE OF EXTERIOR PROTECTION WHERE THERE ARE SIDEWALK OR SHARED-USER PATHS ON THE BRIDGE. THIS SYSTEM IS TYPICALLY USED ON BRIDGES OVER WATERWAY AND CAN ONLY BE USED IF THERE IS A CRASH-TESTED BARRIER BETWEEN THE TRAVEL WAY AND SIDEWALK/SHARED-USER PATHS.
12. BARRIER CONTROL JOINTS SHOULD BE USED WHERE THE LONGITUDINAL BARRIER REINFORCEMENT IS CONTINUOUS THROUGH THE JOINT.
13. BARRIER CONTRACTION JOINTS SHOULD BE USED WHERE THE LONGITUDINAL BARRIER REINFORCEMENT TERMINATES AT THE JOINT.
14. THE LONGITUDINAL BARRIER REINFORCEMENT SHOULD BE CONTINUOUS BETWEEN MINIMUM OF TWO, AND MAXIMUM OF THREE BARRIER SECTIONS
15. \*TYPICAL END BARRIER\* SECTIONS AS SHOWN ON SHEETS 1 TO 5 ASSUMES BARRIER CONNECTION APPROACH TYPE 3-31 WILL BE ATTACHED TO THE END BARRIERS, IF THERE ARE NO CURRENT PLANS TO ATTACH THE APPROACH GUARDRAILS TO THE BARRIER, THE DESIGNER STILL SHOULD TAPER THE END BARRIERS IN AN EVENT THE GUARDRAIL WILL BE ATTACHED TO THE END BARRIER IN THE FUTURE.
16. ALL BARRIER END POSTS MUST FOLLOW THE APPROPRIATE SHAPE APPLICATION ON SHEETS 4 AND 5. UNLESS INDICATED OTHERWISE, THE REINFORCING IN THE END POSTS SHOULD MATCH THE APPROPRIATE APPLICATION OF SHEETS 1 TO 3.
17. BARRIER SECTIONS LENGTHS MUST BE MINIMUM OF 8'-0" AND MAXIMUM OF 10'-0". FOR SHORT SPANS (TYPICALLY BOX CULVERTS OR RIGID FRAMES), THE DESIGNER SHOULD CONSIDER USING GUARDRAIL OVER CULVERTS IF APPLICABLE, OR IF ONLY ONE OR TWO SECTIONS OF BARRIERS ARE REQUIRED ON EACH SIDE OF THE BRIDGE, THE 10'-0" MAXIMUM SECTION LENGTH REQUIREMENT MAY BE EXTENDED TO MAXIMUM SECTION LENGTH OF 11'-6".



## BARRIER CONTROL JOINT DETAIL (ELEVATION)

(REINFORCEMENT CONTINUOUS THROUGH JOINT)

## BARRIER CONTRACTION JOINT DETAIL

(REINFORCEMENT NOT CONTINUOUS THROUGH JOINT)

NOTE: USE OF PARAFFIN COAT AT THE JOINT OR A 3/4" OPEN JOINT IS PERMITTED. BARRIER EXPANSION JOINT DETAIL SIMILAR TO BARRIER CONTRACTION JOINT DETAIL WITH OPENING TYPICALLY GREATER THAN 2 INCHES. REFER TO DETAIL NO. 340.01 FOR MORE INFORMATION.



DELAWARE DEPARTMENT OF TRANSPORTATION  
BRIDGE DESIGN MANUAL

BRIDGE RAILING DETAILS

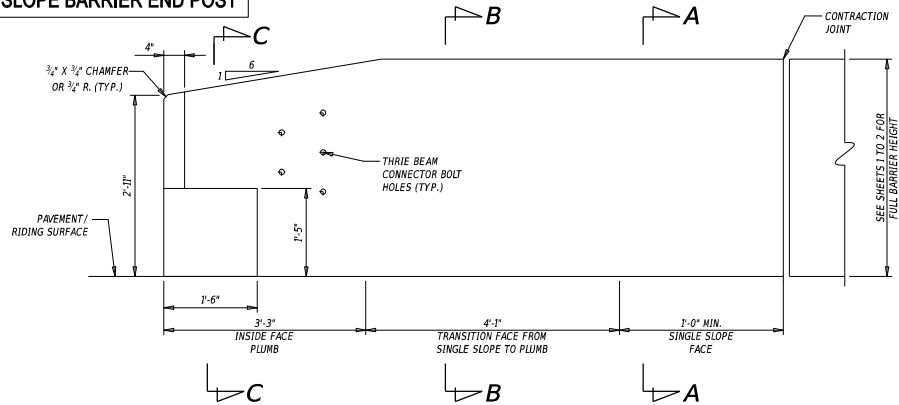
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ISSUE DATE	
10/01/2015	04/01/2021
10/01/2016	
01/31/2019	

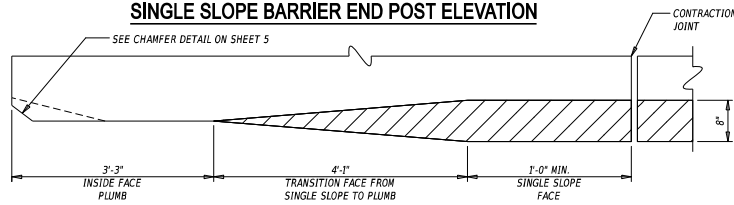
DETAIL No. 325.02

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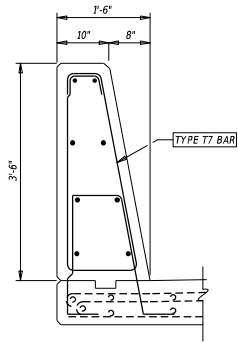
## SINGLE SLOPE BARRIER END POST



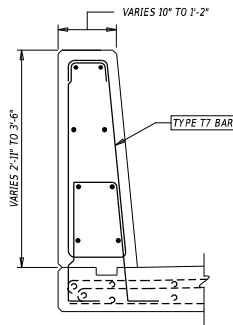
**SINGLE SLOPE BARRIER END POST ELEVATION**



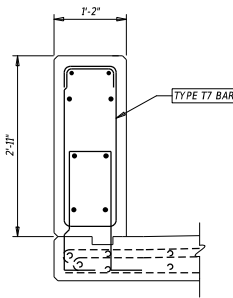
**SINGLE SLOPE BARRIER END POST PLAN**



**SECTION A-A**



**SECTION B-B**

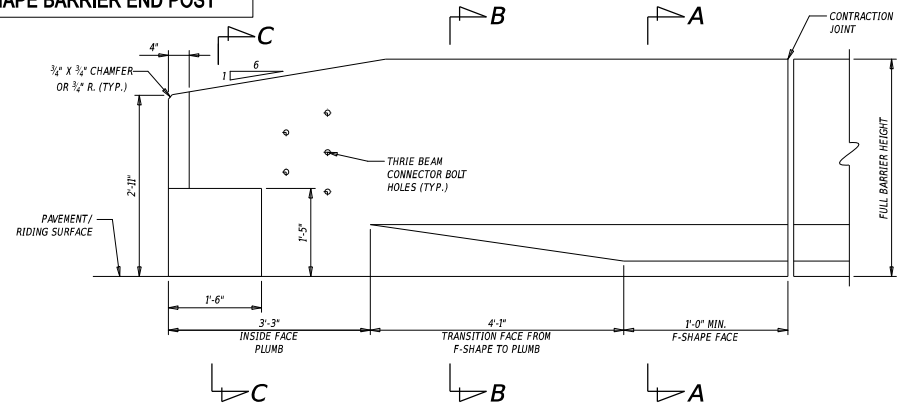


**SECTION C-C**

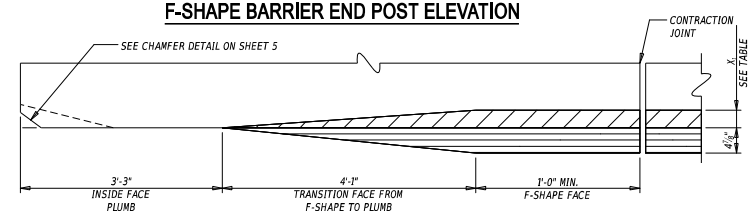
### DESIGNER NOTES

- THRIE BEAM TRAFFIC BARRIER NOT SHOWN FOR CLARITY. REFER TO DELDOT STANDARD CONSTRUCTION DETAIL B-9 FOR MORE INFORMATION.
- VERTICAL HEIGHT TRANSITIONS WILL OCCUR AT A RATIO OF 6 HORIZONTAL TO 1 VERTICAL. THE INSIDE FACE OF THE BARRIER MUST REMAIN PLUMB 6" PAST THE THRIE BEAM CONNECTION END TERMINAL PLATE. AFTER THIS HORIZONTAL DISTANCE, THE BARRIER FACE MAY TRANSITION Laterally AT A RATE OF 10:1. THE VIEWS DEPICTED ARE FOR THE 42" SINGLE SLOPE BARRIER, HOWEVER, THESE TRANSITION RATES ALSO APPLY TO THE 50" SINGLE SLOPE MEDIAN BARRIER AND THE 54" SINGLE SLOPE BARRIER.
- LONGITUDINAL REINFORCING SHALL BE FIELD BENT AROUND END CHAMFERS. VERTICAL REINFORCING SHALL BE SPACED TO PROVIDE A 2" CLEAR MINIMUM BETWEEN THE REINFORCING STEEL AND THE CONCRETE FACE. ADDITIONAL CHAMFER DETAILS SHOWN ON SHEET 5.
- END POST REINFORCING SHALL MATCH SIZE AND SPACING SHOWN ON SHEETS 1 TO 2 OF THIS DETAIL.
- REFER TO BARRIER CONTRACTION JOINT DETAIL ON SHEET 3 FOR ADDITIONAL JOINT INFORMATION.

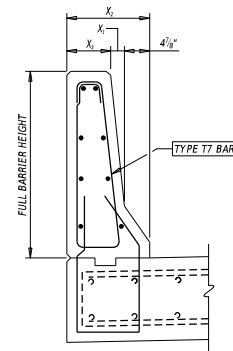
## F-SHAPE BARRIER END POST



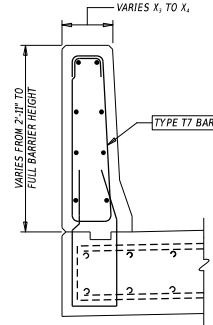
**F-SHAPE BARRIER END POST ELEVATION**



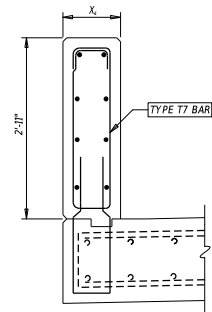
**F-SHAPE BARRIER END POST PLAN**



**SECTION A-A**



**SECTION B-B**



**SECTION C-C**

F-SHAPE HEIGHT	$X_1$	$X_2$	$X_3$	$X_4$
3'-0"	2 1/2"	1'-4"	8 1/2"	11 1/2"
3'-6"	3 1/2"	1'-5 1/4"	9"	1'-0 1/8"

### DESIGNER NOTES

- THRIE BEAM TRAFFIC BARRIER NOT SHOWN FOR CLARITY. REFER TO DELDOT STANDARD CONSTRUCTION DETAIL B-9 FOR MORE INFORMATION.
- DIMENSIONS FOR THE 3'-6" F-SHAPE ARE INCLUDED FOR LEGACY PURPOSES.
- VERTICAL HEIGHT TRANSITIONS WILL OCCUR AT A RATIO OF 6 HORIZONTAL TO 1 VERTICAL. THE INSIDE FACE OF THE BARRIER MUST REMAIN PLUMB 6" PAST THE THRIE BEAM CONNECTION END TERMINAL PLATE. AFTER THIS HORIZONTAL DISTANCE, THE BARRIER FACE MAY TRANSITION Laterally AT A RATE OF 10:1.
- LONGITUDINAL REINFORCING SHALL BE FIELD BENT AROUND END CHAMFERS. VERTICAL REINFORCING SHALL BE SPACED TO PROVIDE A 2" CLEAR MINIMUM BETWEEN THE REINFORCING STEEL AND THE CONCRETE FACE. ADDITIONAL CHAMFER DETAILS SHOWN ON SHEET 5.
- END POST REINFORCING SHALL MATCH SIZE AND SPACING SHOWN ON SHEETS 1 TO 3 OF THIS DETAIL.
- REFER TO BARRIER CONTRACTION JOINT DETAIL ON SHEET 3 FOR ADDITIONAL INFORMATION.



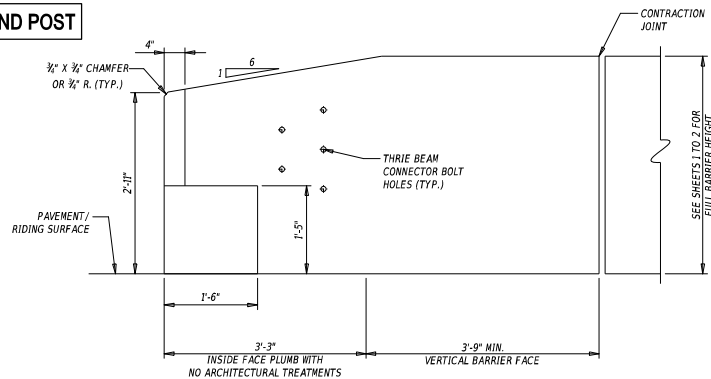
**DELAWARE DEPARTMENT OF TRANSPORTATION  
BRIDGE DESIGN MANUAL**

**BRIDGE RAILING DETAILS**

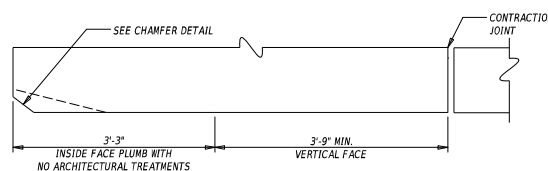
**NOT TO SCALE**

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## VERTICAL FACE BARRIER END POST



**VERTICAL FACE BARRIER END POST ELEVATION**

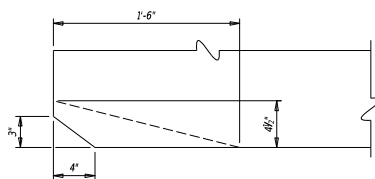


**VERTICAL FACE BARRIER END POST PLAN**

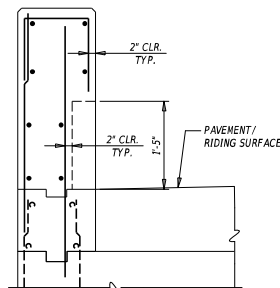
## DESIGNER NOTES

- THRIE BEAM TRAFFIC BARRIER NOT SHOWN FOR CLARITY. REFER TO DELDOT STANDARD CONSTRUCTION DETAIL B-9 FOR MORE INFORMATION.
- VERTICAL HEIGHT TRANSITIONS WILL OCCUR AT A RATIO OF 6 HORIZONTAL TO 1 VERTICAL.
- LONGITUDINAL REINFORCING SHALL BE FIELD BENT AROUND END CHAMFERS. VERTICAL REINFORCING SHALL BE SPACED TO PROVIDE A 2" CLEAR MINIMUM BETWEEN THE REINFORCING STEEL AND THE CONCRETE FACE. ADDITIONAL CHAMFER DETAILS SHOWN ON THIS SHEET.
- END POST REINFORCING SHALL MATCH SIZE AND SPACING SHOWN ON SHEETS 1 TO 2 OF THIS DETAIL.
- REFER TO BARRIER CONTRACTION JOINT DETAIL ON SHEET 3 FOR ADDITIONAL INFORMATION.

## TYPICAL END POST CHAMFER DETAILS

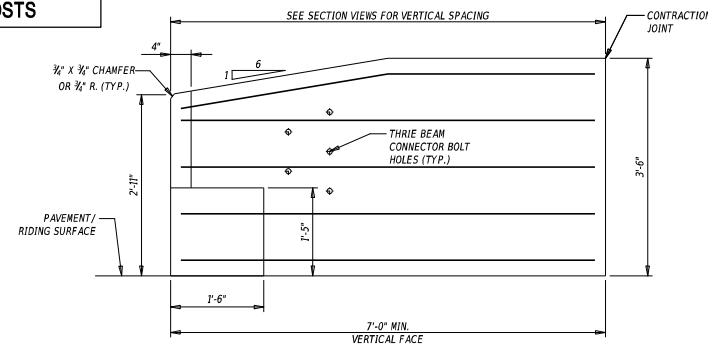


**CHAMFER DETAIL**

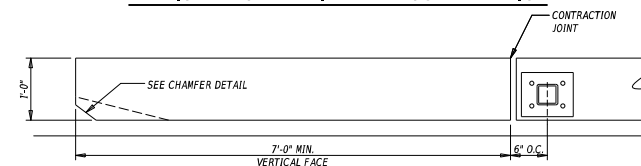


**VERTICAL REINFORCING DETAIL IN CHAMFER**

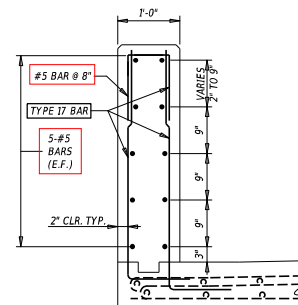
## TUBE RAIL END POSTS



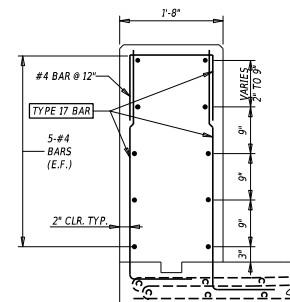
**VERTICAL FACE BARRIER END POST ELEVATION**



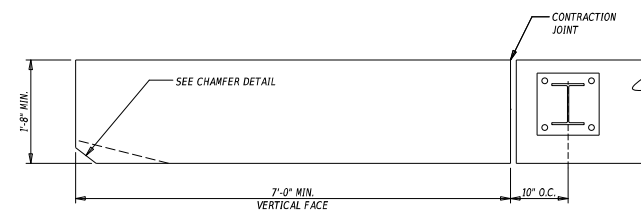
**2 STRAND TUBE RAIL BARRIER END POST PLAN**



**2 STRAND TUBE RAIL BARRIER END POST SECTION**



**3 STRAND TUBE RAIL BARRIER END POST SECTION**



**3 STRAND TUBE RAIL BARRIER END POST PLAN**

## DESIGNER NOTES

- THRIE BEAM TRAFFIC BARRIER NOT SHOWN FOR CLARITY. REFER TO DELDOT STANDARD CONSTRUCTION DETAIL B-9 FOR MORE INFORMATION.
- VERTICAL HEIGHT TRANSITIONS WILL OCCUR AT A RATIO OF 6 HORIZONTAL TO 1 VERTICAL.
- LONGITUDINAL REINFORCING SHALL BE FIELD BENT AROUND END CHAMFERS. VERTICAL REINFORCING SHALL BE SPACED TO PROVIDE A 2" CLEAR MINIMUM BETWEEN THE REINFORCING STEEL AND THE CONCRETE FACE. ADDITIONAL CHAMFER DETAILS SHOWN ON THIS SHEET.
- REFER TO BARRIER CONTRACTION JOINT DETAIL ON SHEET 3 FOR ADDITIONAL INFORMATION.
- REFER TO SHEET 8 FOR ALTERNATE 3 STRAND TUBE RAIL PARAPET TRANSITION.

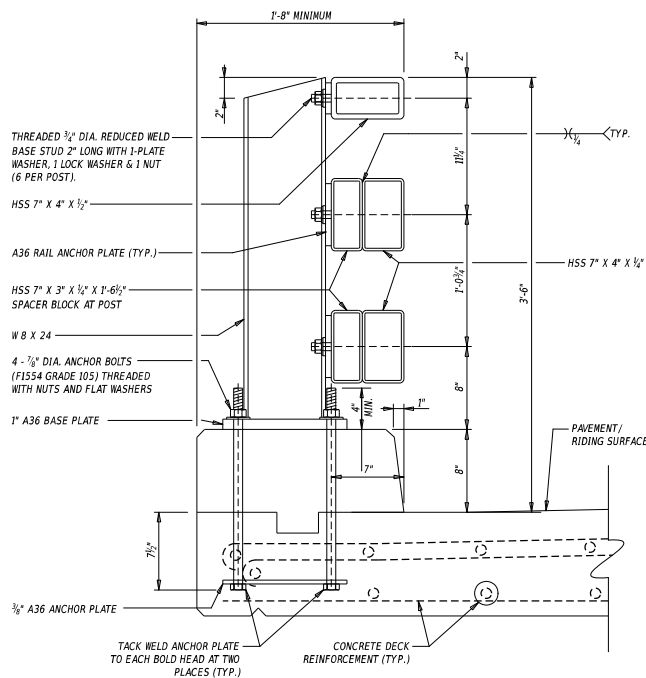


DELAWARE DEPARTMENT OF TRANSPORTATION  
BRIDGE DESIGN MANUAL

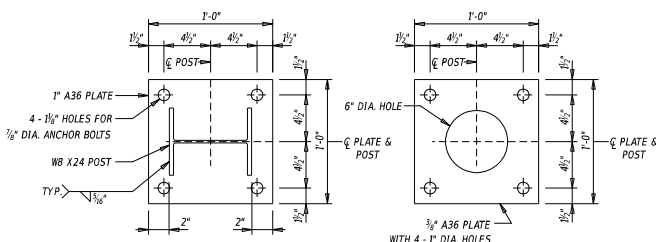
BRIDGE RAILING DETAILS

NOT TO SCALE

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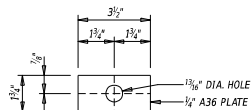


**3 STRAND TUBE RAIL PARAPET SECTION**

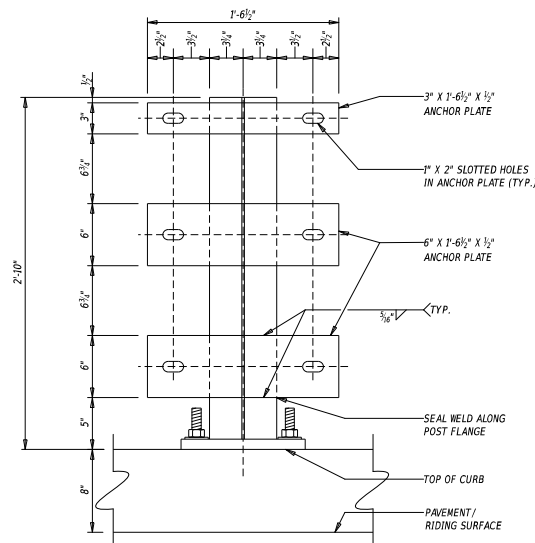


**BASE PLATE DETAIL**

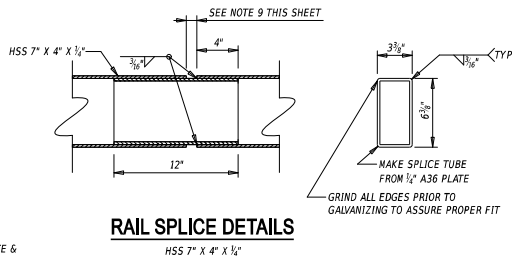
**ANCHOR PLATE DETAIL**



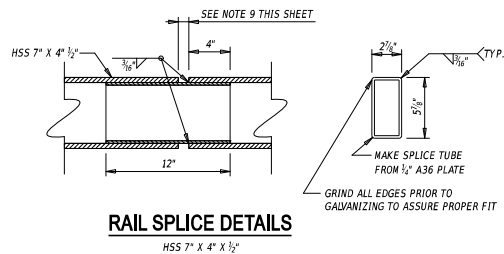
**PLATE WASHER DETAIL**



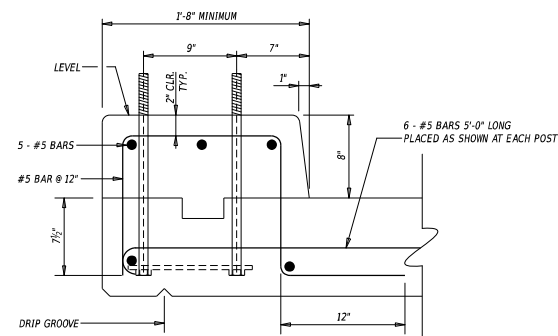
**RAIL ANCHOR PLATE ELEVATION**



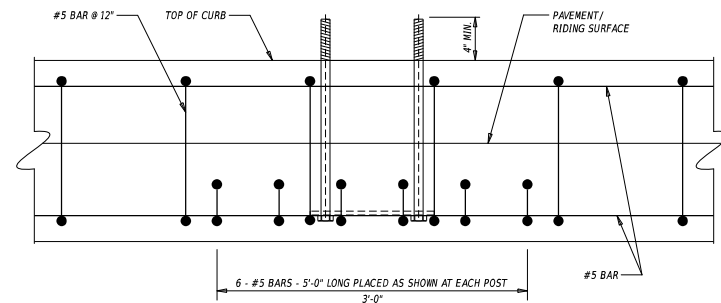
**RAIL SPLICE DETAILS**



**RAIL SPLICE DETAILS**



**CURB REINFORCEMENT SECTION**

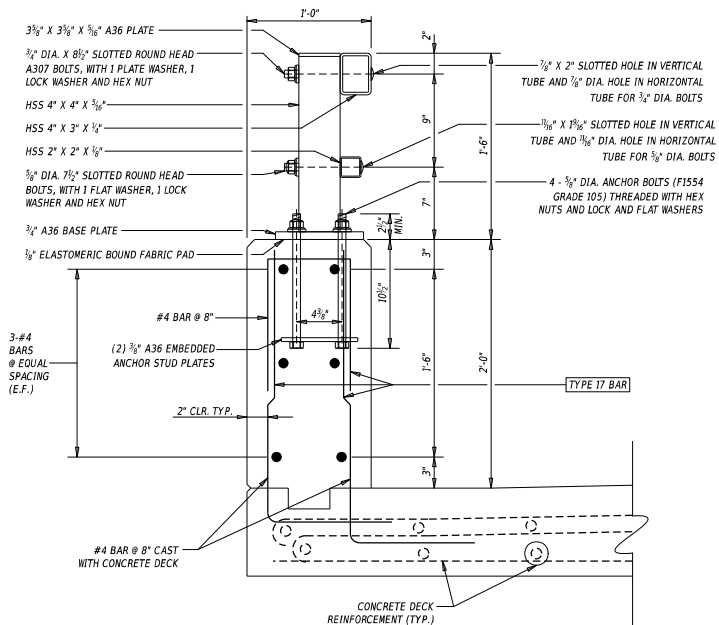


**CURB REINFORCEMENT ELEVATION**

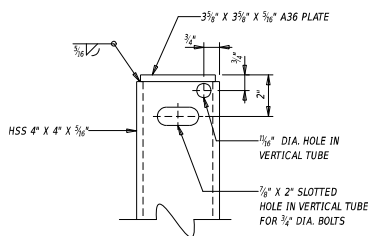
**GENERAL 3 STRAND TUBE RAIL PARAPET NOTES**

1. RAILS SHALL BE PARALLEL TO THE GRADE OF THE ROADWAY. RAIL SECTIONS SHALL BE ATTACHED TO AS MANY POSTS AS POSSIBLE, BUT NOT LESS THAN TWO.
2. THE CENTER LINE OF ANY SPLICE AND/OR CONTRACTION JOINT SHALL BE LOCATED AT LEAST 2'-0" AWAY FROM CENTER LINE OF A POST. CONTRACTION AND/OR SPLICE JOINTS FOR EACH STRAND OF THREE STRAND RAILING SHALL BE PLACED IN THE SAME LOCATION AND IN THE SAME PANEL.
3. RAIL ELEMENTS SHALL BE STRUCTURAL TUBING IN ACCORDANCE WITH ASTM A500 GRADE C.
4. STEEL POSTS AND PLATES SHALL CONFORM TO ASTM A36 UNLESS OTHERWISE NOTED.
5. POSTS SHALL BE SET VERTICAL. MAXIMUM POST SPACING IS 10'-0".
6. ALL STRUCTURAL STEEL COMPONENTS INCLUDING FASTENERS SHALL BE HOT-DIP GALVANIZED AS PER ASTM A123 AFTER FABRICATION, EXCEPT AS NOTED. ALL ANCHOR PLATES SHALL BE ATTACHED BEFORE GALVANIZING.
7. ANCHOR BOLTS MUST BE SET SO THAT AT LEAST 4" OF THREAD FROM THE BOLT IS EXPOSED ABOVE THE TOP OF THE CURB.
8. PLATE WASHERS SHALL BE POSITIONED TO COMPLETELY COVER SLOTTED HOLES.
9. TUBE RAIL SPLICE JOINTS SHALL BE SPLICED AT 1-INCH. PROVIDE TUBE RAIL SPLICING AT 4-INCH OVER DECK EXPANSION JOINTS.
10. FABRICATION AND INSTALLATION OF THE 3 STRAND TUBE RAIL PARAPET SYSTEM WILL BE INCIDENTAL TO ITEM 626501 - THREE STRAND TUBE RAIL PARAPET.

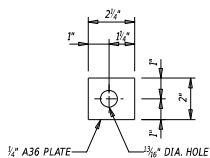




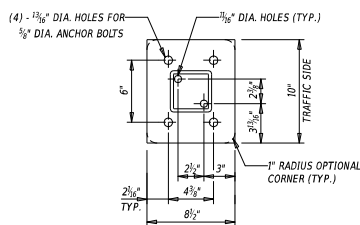
**2 STRAND TUBE RAIL PARAPET SECTION**



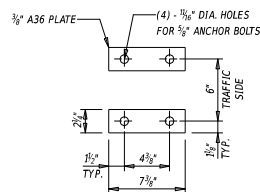
**VERTICAL TUBE DETAIL**



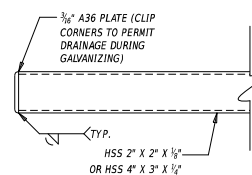
**PLATE WASHER DETAIL**



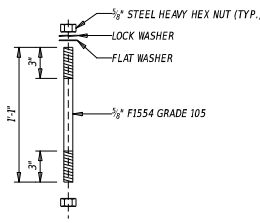
**BASE PLATE DETAIL**



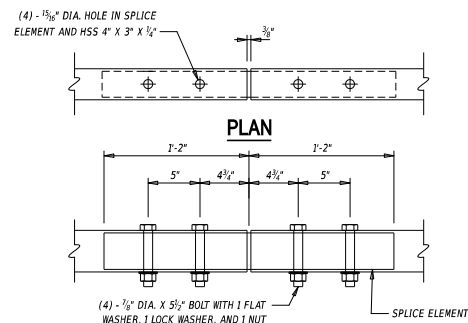
**EMBEDDED ANCHOR STUD PLATE DETAIL**



**END OF RAIL**

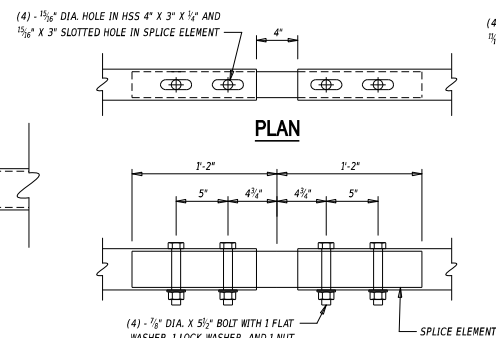


**ANCHOR BOLT DETAIL**



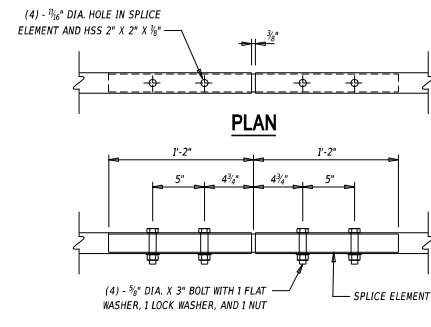
**FIXED JOINT SPLICE PLAN AND SECTION**

HSS 4 x 3 x 1/4



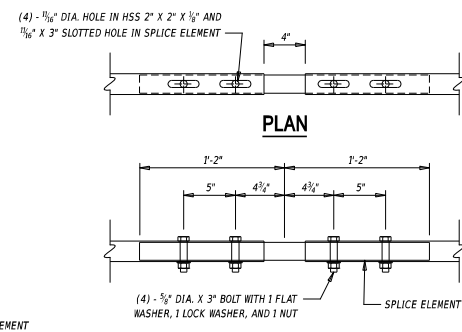
**EXPANSION JOINT SPLICE PLAN AND SECTION**

HSS 4 x 3 x 1/4



**FIXED JOINT SPLICE PLAN AND SECTION**

HSS 2 x 2 x 1/8

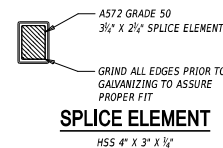


**EXPANSION JOINT SPLICE PLAN AND SECTION**

HSS 2 x 2 x 1/8

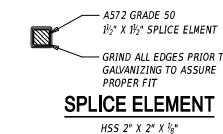
**GENERAL 2 STRAND TUBE RAIL PARAPET NOTES**

1. THE CENTER LINE OF ANY SPLICE AND/OR CONTRACTION JOINT SHALL BE LOCATED AT LEAST 2'-0" AWAY FROM CENTER LINE OF A POST. CONTRACTION AND/OR SPLICE JOINTS FOR EACH STRAND OF TWO STRAND RAILING SHALL BE PLACED IN THE SAME LOCATION AND IN THE SAME PANEL.
2. RAIL ELEMENTS SHALL BE STRUCTURAL TUBING IN ACCORDANCE WITH ASTM A500 GRADE C.
3. POSTS SHALL BE SET VERTICAL. MAXIMUM POST SPACING IS 6'-8".
4. ALL STRUCTURAL STEEL COMPONENTS INCLUDING FASTENERS SHALL BE HOT-DIP GALVANIZED AS PER ASTM A123 AFTER FABRICATION, EXCEPT AS NOTED.
5. PLATE WASHERS SHALL BE POSITIONED TO COMPLETELY COVER SLOTTED HOLES.
6. FABRICATION AND INSTALLATION OF THE 2 STRAND TUBE RAIL PARAPET SYSTEM WILL BE INCIDENTAL TO ITEM 626502 - TWO STRAND TUBE RAIL PARAPET.



**SPlice ELEMENT**

HSS 4 x 3 x 1/4

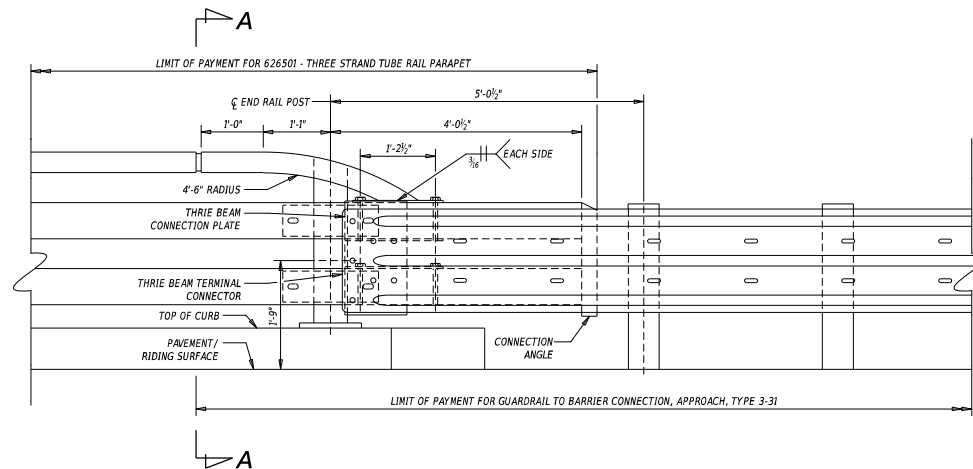


**SPlice ELEMENT**

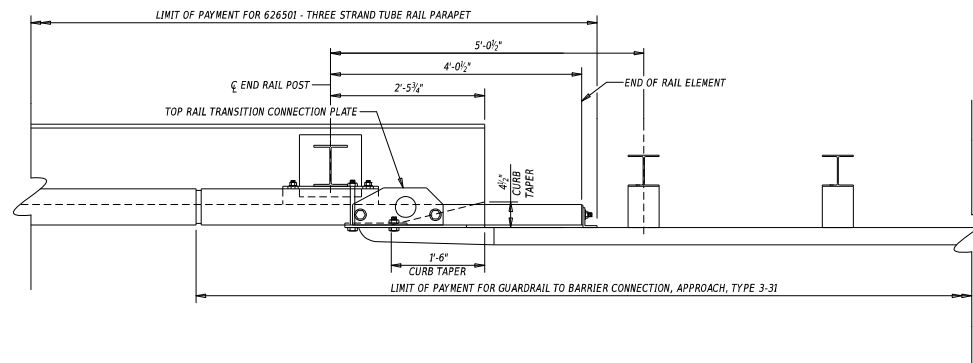
HSS 2 x 2 x 1/8



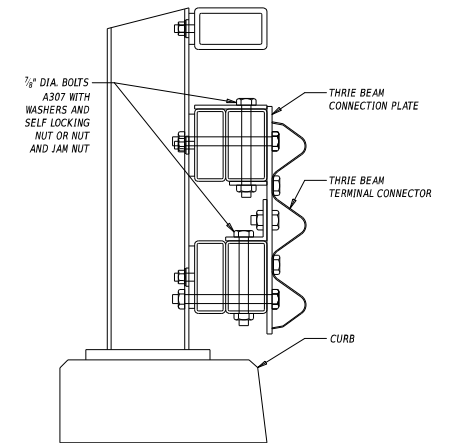
# ALTERNATE TUBE RAIL TRANSITION



ALTERNATE TUBE RAIL TRANSITION ELEVATION



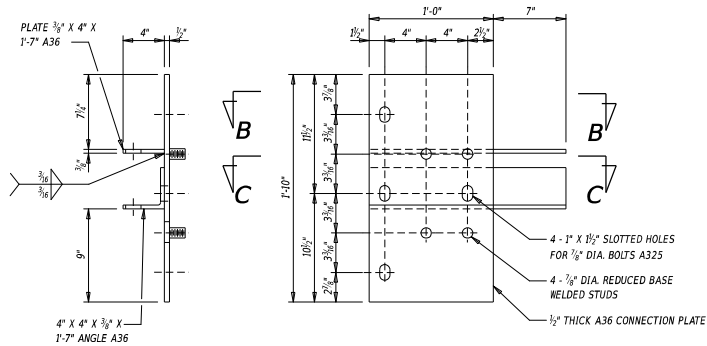
ALTERNATE TUBE RAIL TRANSITION PLAN



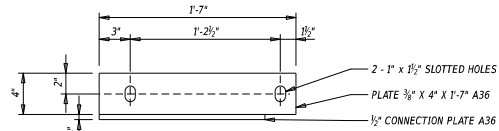
SECTION A-A



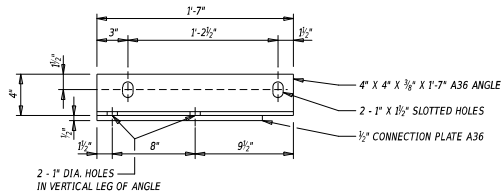
## ALTERNATE TUBE RAIL TRANSITION



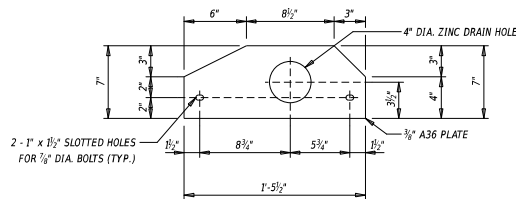
**THRIE BEAM CONNECTION PLATE DETAIL**



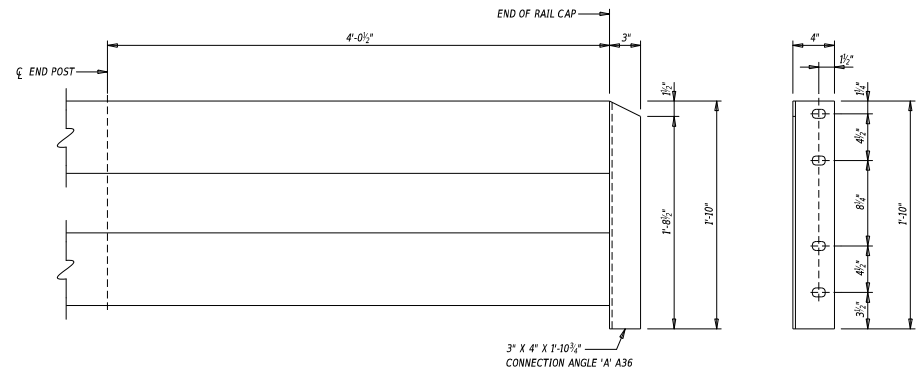
**SECTION B-B**



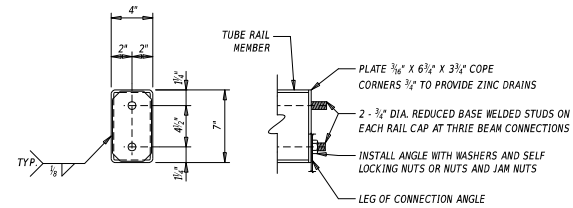
**SECTION C-C**



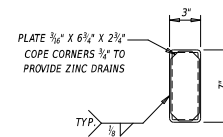
**TOP RAIL TRANSITION PLATE**



**CONNECTION ANGLE DETAIL**



**RAIL CAP DETAIL**



**RAIL CAP FOR SPACER BLOCK DETAIL**

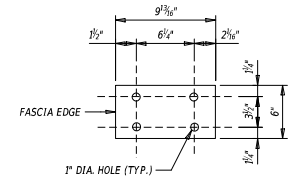
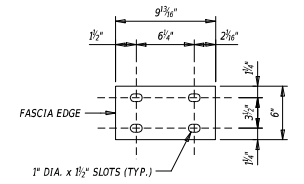
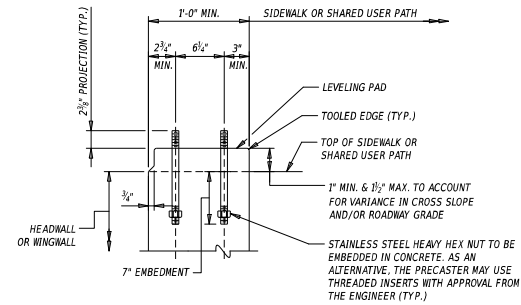
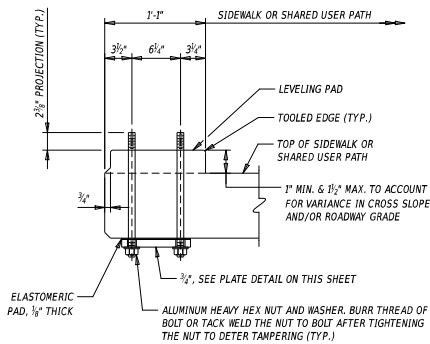
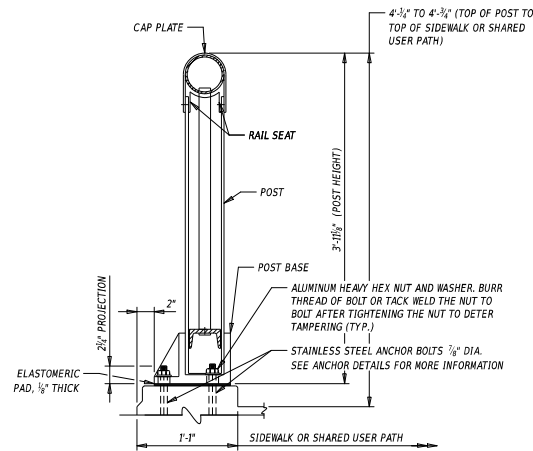
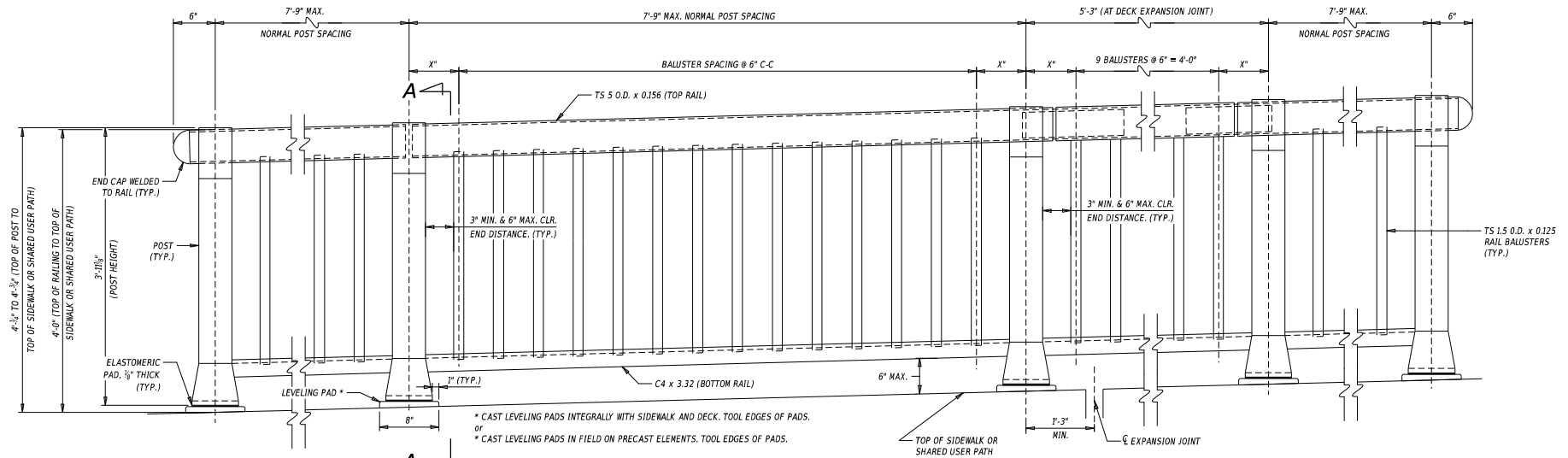
## ALTERNATE TUBE RAIL TRANSITION

- SEE DELDOT STANDARD CONSTRUCTION DETAIL NO. B-10 FOR ADDITIONAL INFORMATION ON POST SIZING, POST SPACING, AND PAY LIMITS FOR ATTACHING APPROACH BARRIER TO GUARDRAIL CONNECTION. MOUNT THE THRIE BEAM GUARDRAIL TO THE BRIDGE RAIL END AT 31° AND SUBSTITUTE THE SYMMETRIC W-BEAM TO THRIE-BEAM TRANSITION WITH THE ASYMMETRIC TRANSITION SHOWN IN DELDOT STANDARD CONSTRUCTION DETAIL NO. B-13 SHEET 6.
- ALL HARDWARE REQUIRED TO CONNECT THE THRIE BEAM TRANSITION TO THE PARAPET END WILL BE INCIDENTAL TO ITEM 626501 - THREE STRAND TUBE RAIL PARAPET.
- LAP APPROACH GUARDRAIL TO PREVENT SNAGS FROM ONCOMING TRAFFIC.
- PLACE GUARDRAIL REFLECTOR AS PER THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.



# ALUMINUM PEDESTRIAN RAILING

NOTE: MAINTAIN UNIFORM NORMAL POST SPACING WHEN POSSIBLE.



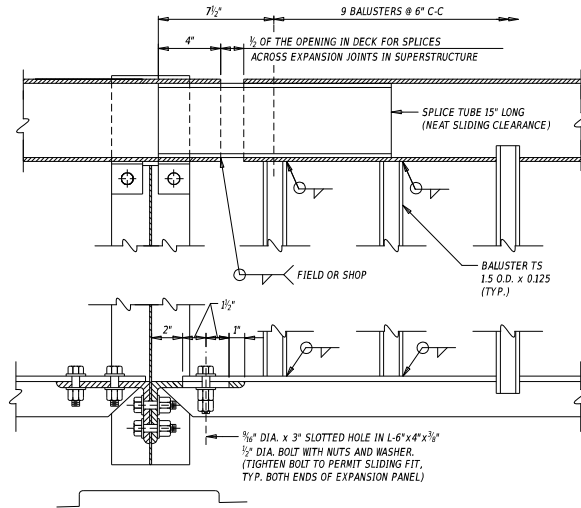
DELAWARE DEPARTMENT OF TRANSPORTATION  
BRIDGE DESIGN MANUAL

BRIDGE RAILING DETAILS

NOT TO SCALE

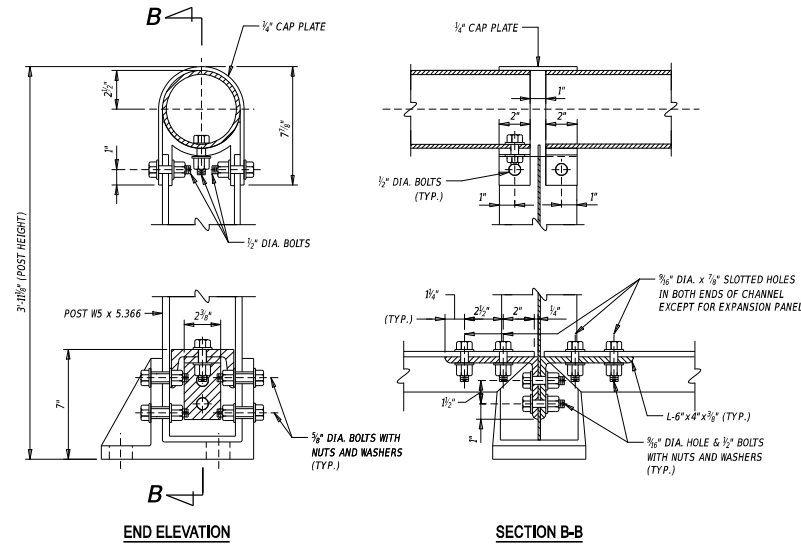
ISSUE DATE	DETAIL No. 325.02
10/01/2015	
04/01/2021	
	SHEET No. 10 of 11

## ALUMINUM PEDESTRIAN RAILING



**TYPICAL EXPANSION PANEL DETAIL**

NOTE: POST BASE NOT SHOWN FOR CLARITY.



**END ELEVATION**

**TYPICAL DETAIL AT POST**

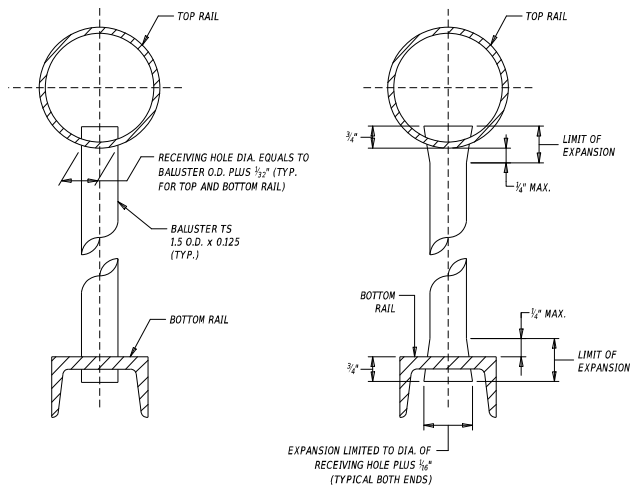
**SECTION B-B**

## GENERAL ALUMINUM PEDESTRIAN RAILING NOTES

1. PLACE POSTS, BALUSTERS, AND ANCHOR BOLTS TRULY VERTICAL. PLACE RAILS PARALLEL TO GRADE.
2. PLACE END CAPS FLUSH WITH RAILS.
3. DO NOT PAINT ANY MATERIALS.
4. PROVIDE UNIFORM SPACING OF BALUSTERS IN EACH PANEL. IF POST SPACING SHOWN ON (sheets 10 and 11, edit as needed) DOES NOT RESULT IN 6" SPACING FOR THE BALUSTERS, ADJUST THE DIFFERENCE BY INCREASING OR DECREASING BALUSTER SPACING BY NOT MORE THAN 1/2". WHEN REQUIRED, ADJUST END CLEAR SPACING BETWEEN POST TO ADJACENT BALUSTER FROM 3" MIN. TO 6" MAX.
5. SIMILAR ALUMINUM RAILING SYSTEM MAY BE SUBSTITUTED FOR THE SPECIFIED RAILING SYSTEM WITH APPROVAL OF THE ENGINEER.
6. FABRICATION AND INSTALLATION OF THE ALUMINUM RAILING SYSTEM WILL BE INCIDENTAL TO ITEM 626010 - ALUMINUM PEDESTRIAN RAILING.

## MATERIAL NOTES

1. MATERIALS FOR ALUMINUM RAILING SYSTEM AND NUTS MUST MEET REQUIREMENTS OF ASTM B221 ALLOY 6061-T6.
2. ELASTOMERIC PADS MUST MEET REQUIREMENTS OF 60 +/- SHORE A DUROMETER.
3. STAINLESS STEEL HEX NUTS MUST MEET REQUIREMENTS OF ASTM A306.
4. BOLTS MUST MEET REQUIREMENTS OF ASTM B211, ALUMINUM ALLOY 2024-T4.
5. ANCHOR BOLTS MUST MEET REQUIREMENTS OF ASTM A276, TYPE 304 OR TYPE 430 (THREADS TO BE ROLLED NOT CUT).
6. ALUMINUM WASHERS MUST MEET REQUIREMENTS OF ASTM B209 ALLOY ALCLAD 2024-T4.

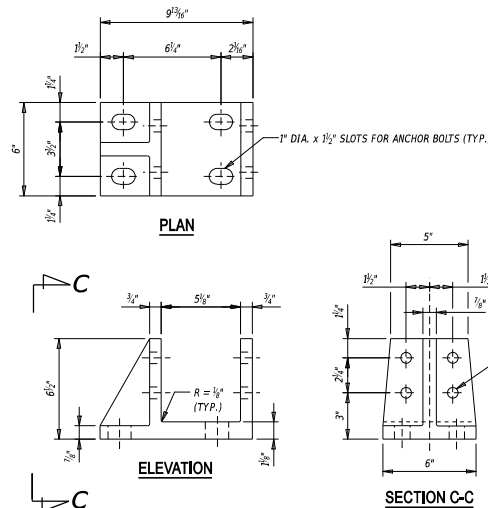


**PRIOR TO EXPANDING**

**EXPANDED**

## BALUSTER DETAILS

EXPAND FULL CIRCUMFERENCE OF BALUSTER WITHIN THE LIMIT OF EXPANSION.

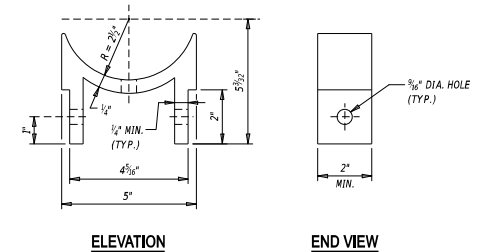


**PLAN**

**ELEVATION**

**SECTION C-C**

## POLE BASE DETAIL



**ELEVATION**

**END VIEW**

## RAIL SEAT DETAIL



DELAWARE DEPARTMENT OF TRANSPORTATION  
BRIDGE DESIGN MANUAL

## BRIDGE RAILING DETAILS

NOT TO SCALE

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10/01/2017		SHEET No. 11 of 11
04/01/2021		